

Claims

- [c1] 1. A wafer structure, comprising:
- a wafer having a plurality of bonding pads, wherein the bonding pads are disposed on an active surface of the wafer;
 - a first passivation layer covering the active surface of the wafer, wherein the bonding pads are exposed by the first passivation layer;
 - an under ball metallurgy (UBM) layer disposed on each of the bonding pads, wherein the UBM layer comprises a first metallic layer and a second metallic layer disposed on the first metallic layer, the first metallic layer covering a portion of the first passivation layer;
 - a second passivation layer disposed on the first passivation layer, wherein the second passivation layer covers a peripheral portion of the first metallic layer, without covering the second metallic layer; and
 - a plurality of bumps, disposed on the UBM layer.
- [c2] 2. The structure of claim 1, wherein the UBM layer comprises:
- an adhesion layer, disposed on the bonding pad;
 - a barrier layer disposed on the adhesion layer;

a wetting layer disposed between the barrier layer and the bump.

- [c3] 3. The structure of claim 2, wherein the adhesion layer is a single layer or comprises a plurality of layers.
- [c4] 4. The structure of claim 2, wherein the barrier layer is a single layer or comprises a plurality of layers.
- [c5] 5. The structure of claim 2, wherein the wetting layer is a single layer or comprises a plurality of layers.
- [c6] 6. The structure of claim 2, wherein the first metallic layer includes the adhesion layer and the second metallic layer includes the barrier layer and the wetting layer.
- [c7] 7. The structure of claim 2, wherein the first metallic layer includes the adhesion layer and the barrier layer and the second metallic layer includes the wetting layer.
- [c8] 8. The structure of claim 2, wherein a material of the adhesion layer is titanium or aluminum.
- [c9] 9. The structure of claim 2, wherein a material of the barrier layer is selected from the group consisting of nickel-vanadium alloy, titanium nitride, tantalum nitride and nickel.
- [c10] 10 The structure of claim 2, wherein a material of the

wetting layer includes copper.

- [c11] 11. The structure of claim 2, wherein a material of the second passivation layer is benzocyclobutene (BCB) or polyimide (PI).
- [c12] 12. The structure of claim 2, wherein a material of the bumps includes tin/lead alloy.
- [c13] 13. The structure of claim 2, wherein the bumps are in globular shapes or pillar shapes.
- [c14] 14. A bumping process for forming a plurality of bumps on a wafer, comprising:
 - providing a wafer having a plurality of bonding pads and a first passivation layer covering an active surface of the wafer, wherein the bonding pads are disposed on the active surface of the wafer and are exposed by the first passivation layer;
 - forming a first metallic layer over the wafer, wherein the first metallic layer covers a portion of the first passivation layer;
 - forming a second passivation layer on the first passivation layer, wherein the second passivation layer covers a peripheral portion of the first metallic layer;
 - forming a second metallic layer on the first metallic layer; and
 - forming a plurality of bumps on the second metallic

layer.

[c15] 15. The process of claim 14, wherein the steps of forming the first and the second metallic layers comprise:
forming an adhesion layer over the wafer;
patterning the adhesion layer, so that the adhesion layer is disposed on the bonding pad and covers a portion of the first passivation layer; and after forming the second passivation layer on the first passivation layer,
forming a barrier layer on the adhesion layer;
forming a wetting layer on the barrier layer; and
patterning the barrier layer and the wetting layer, so that the remained barrier layer and the wetting layer are disposed above the bonding pad without being covered by the second passivation layer.

[c16] 16. The process of claim 14, wherein the steps of forming the first and the second metallic layers comprise:
forming an adhesion layer over the wafer;
forming a barrier layer on the adhesion layer;
patterning the adhesion layer and the barrier layer, so that the remained adhesion layer and the barrier layer are disposed on the bonding pad and cover a portion of the first passivation layer; and after forming the second passivation layer on the first passivation layer,
forming a wetting layer on the barrier layer; and
patterning the wetting layer, so that the remained wet-

ting layer is disposed above the bonding pad without being covered by the second passivation layer.

- [c17] 17. The process of claim 14, the step of forming the second passivation layer comprises forming a polymer layer over the wafer and patterning the polymer layer.
- [c18] 18. The process of claim 14, wherein the step for forming the bumps comprises:
forming a mask layer over the wafer, wherein the mask layer includes a plurality of openings and the second metallic layer is exposed by the openings;
filling a solder material into the openings; and
removing the mask layer.
- [c19] 19. The process of claim 18, wherein the step for forming the bumps further comprises performing a reflow process to turn the solder material in the openings into the bumps.
- [c20] 20. The process of claim 18, wherein the method for filling the solder material is selected from the group consisting of printing, plating and evaporation.
- [c21] 21. The process of claim 14, wherein the steps of forming the first and the second metallic layers and forming a plurality of bumps on the second metallic layer comprise:

forming an adhesion layer over the wafer;
patterning the adhesion layer, so that the adhesion layer is disposed on the bonding pad and covers a portion of the first passivation layer; and after forming the second passivation layer on the first passivation layer;
forming a barrier layer on the adhesion layer;
forming a wetting layer on the barrier layer;
forming the bumps on the wetting layer of the second metallic layer, and after forming the bumps on the wetting layer;
patterning the barrier layer and the wetting layer by using the bumps as masks, so that the remained barrier layer and the wetting layer are disposed above the bonding pad without being covered by the second passivation layer.

[c22] 22. The process of claim 14, wherein the steps of forming the first and the second metallic layers and forming a plurality of bumps on the second metallic layer comprise:

forming an adhesion layer over the wafer;
forming a barrier layer on the adhesion layer;
patterning the adhesion layer and the barrier layer, so that the patterned adhesion layer and barrier layer are disposed above the bonding pad and cover a portion of the first passivation layer; and after forming the second

passivation layer on the first passivation layer;
forming a wetting layer on the barrier layer;
forming the bumps on the wetting layer of the second metallic layer, and after forming the bumps on the wetting layer;
patterning the wetting layer by using the bumps as masks, so that the remained wetting layer is disposed above the bonding pad without being covered by the second passivation layer.